

# CMH65R090DT/CMA65R090DT

650V, 82mΩ typ., 40A N-Channel Super Junction Power MOSFET

## General Description

The 65R090DT is power MOSFET using Cmos's advanced super junction technology. The resulting devices provide all benefits of a fast switching super junction MOSFET while offering an extremely fast and robust body diode. This combination of extremely low switching, commutation and conduction losses together with highest robustness make especially resonant switching applications more reliable, more efficient and lighter.

## Features

- Ultra-fast body diode
- 100% avalanche tested
- RoHS Compliant
- Deep Trench

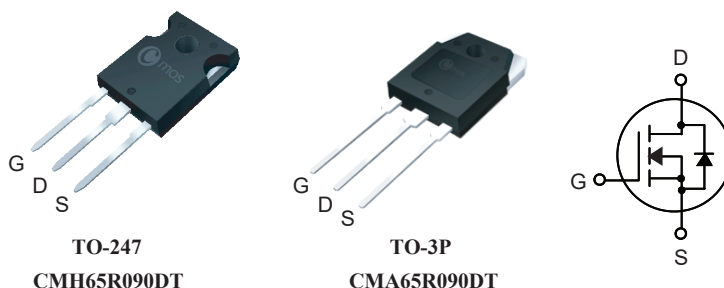
## Product Summary

| BVDSS | R <sub>DS(on)</sub> max. | ID  |
|-------|--------------------------|-----|
| 650V  | 90mΩ                     | 40A |

## Applications

- Charger
- Power Supply

## TO-247/TO-3P Pin Configuration



## Absolute Maximum Ratings

| Symbol                                | Parameter                              | Rating     | Units |
|---------------------------------------|----------------------------------------|------------|-------|
| V <sub>DS</sub>                       | Drain-Source Voltage                   | 650        | V     |
| V <sub>GS</sub>                       | Gate-Source Voltage                    | ±30        | V     |
| I <sub>D</sub> @T <sub>C</sub> =25°C  | Continuous Drain Current               | 40         | A     |
| I <sub>D</sub> @T <sub>C</sub> =100°C | Continuous Drain Current               | 29         | A     |
| I <sub>DM</sub>                       | Pulsed Drain Current                   | 160        | A     |
| EAS                                   | Single Pulse Avalanche Energy (Note 1) | 980        | mJ    |
| P <sub>D</sub> @T <sub>C</sub> =25°C  | Total Power Dissipation                | 470        | W     |
| T <sub>STG</sub>                      | Storage Temperature Range              | -55 to 150 | °C    |
| T <sub>J</sub>                        | Operating Junction Temperature Range   | -55 to 150 | °C    |

## Thermal Data

| Symbol           | Parameter                           | Typ. | Max. | Unit |
|------------------|-------------------------------------|------|------|------|
| R <sub>θJA</sub> | Thermal Resistance Junction-ambient | ---  | 41   | °C/W |
| R <sub>θJC</sub> | Thermal Resistance Junction-case    | ---  | 0.27 | °C/W |

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## Electrical Characteristics (T<sub>J</sub>=25°C , unless otherwise noted)

| Symbol              | Parameter                         | Conditions                                                                                   | Min. | Typ. | Max. | Unit |
|---------------------|-----------------------------------|----------------------------------------------------------------------------------------------|------|------|------|------|
| BV <sub>DSS</sub>   | Drain-Source Breakdown Voltage    | V <sub>GS</sub> =0V , I <sub>D</sub> =250μA                                                  | 650  | ---  | ---  | V    |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance | V <sub>GS</sub> =10V , I <sub>D</sub> =15A                                                   | ---  | 82   | 90   | mΩ   |
| V <sub>GS(th)</sub> | Gate Threshold Voltage            | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA                                     | 3.0  | ---  | 5.0  | V    |
| I <sub>DSS</sub>    | Drain-Source Leakage Current      | V <sub>DS</sub> =650V , V <sub>GS</sub> =0V                                                  | ---  | ---  | 10   | μA   |
| I <sub>GSS</sub>    | Gate-Source Leakage Current       | V <sub>GS</sub> = ±30V , V <sub>DS</sub> =0V                                                 | ---  | ---  | ±100 | nA   |
| g <sub>fs</sub>     | Forward Transconductance          | V <sub>DS</sub> =10V , I <sub>D</sub> = 15A                                                  | ---  | 17   | ---  | S    |
| R <sub>g</sub>      | Gate Resistance                   | V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz                                           | ---  | 3.2  | ---  | Ω    |
| Q <sub>g</sub>      | Total Gate Charge                 | V <sub>DS</sub> =400V , I <sub>D</sub> =12.5A<br>V <sub>GS</sub> =0 to 10V                   | ---  | 53   | ---  | nC   |
| Q <sub>gs</sub>     | Gate-Source Charge                |                                                                                              | ---  | 14   | ---  |      |
| Q <sub>gd</sub>     | Gate-Drain Charge                 |                                                                                              | ---  | 16   | ---  |      |
| T <sub>d(on)</sub>  | Turn-On Delay Time                | V <sub>DD</sub> =400V , I <sub>D</sub> =12.5A<br>R <sub>G</sub> =5.3Ω , V <sub>GS</sub> =13V | ---  | 25   | ---  | ns   |
| T <sub>r</sub>      | Rise Time                         |                                                                                              | ---  | 11   | ---  |      |
| T <sub>d(off)</sub> | Turn-Off Delay Time               |                                                                                              | ---  | 92   | ---  |      |
| T <sub>f</sub>      | Fall Time                         |                                                                                              | ---  | 5    | ---  |      |
| C <sub>iss</sub>    | Input Capacitance                 | V <sub>DS</sub> =100V , V <sub>GS</sub> =0V , f=1MHz                                         | ---  | 2300 | ---  | pF   |
| C <sub>oss</sub>    | Output Capacitance                |                                                                                              | ---  | 100  | ---  |      |
| C <sub>rss</sub>    | Reverse Transfer Capacitance      |                                                                                              | ---  | 4.5  | ---  |      |

## Diode Characteristics

| Symbol          | Parameter                 | Conditions                                                       | Min. | Typ. | Max. | Unit |
|-----------------|---------------------------|------------------------------------------------------------------|------|------|------|------|
| I <sub>S</sub>  | Continuous Source Current | V <sub>G</sub> =V <sub>D</sub> =0V , Force Current               | ---  | ---  | 40   | A    |
| I <sub>SM</sub> | Pulsed Source Current     |                                                                  | ---  | ---  | 160  | A    |
| V <sub>SD</sub> | Diode Forward Voltage     | V <sub>GS</sub> =0V , I <sub>S</sub> =15A , T <sub>J</sub> =25°C | ---  | 0.86 | 1.2  | V    |
| t <sub>rr</sub> | Reverse Recovery Time     | di/dt = 100A/μs                                                  | ---  | 121  | ---  | ns   |
| Q <sub>rr</sub> | Reverse Recovery Charge   | I <sub>F</sub> = 20A , V <sub>DD</sub> =400V                     | ---  | 1.67 | ---  | μC   |

Note :

1. The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=100V , V<sub>GS</sub>=10V , L=10mH , I<sub>AS</sub> =14A.

This product has been designed and qualified for the consumer market.

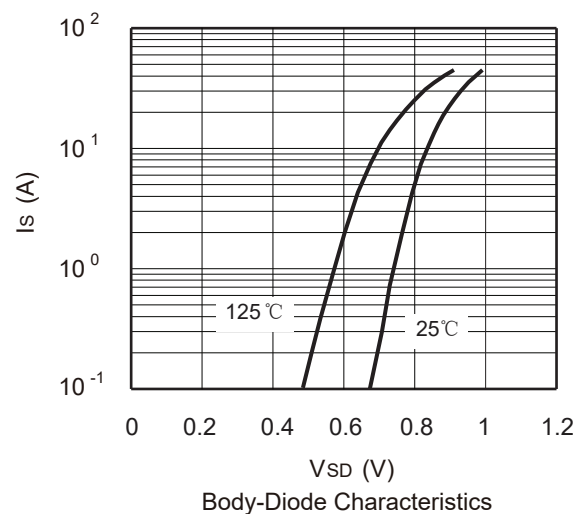
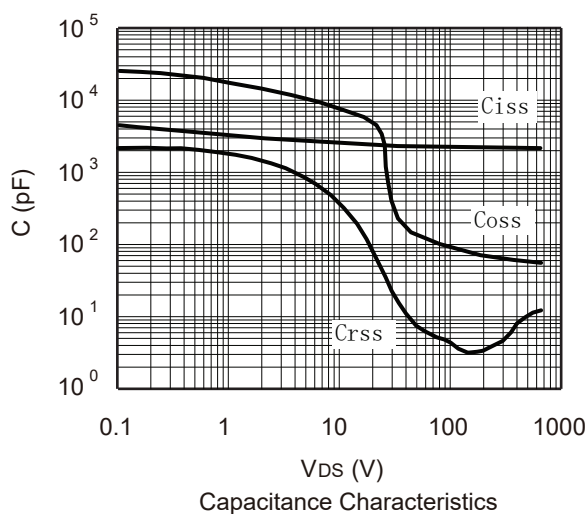
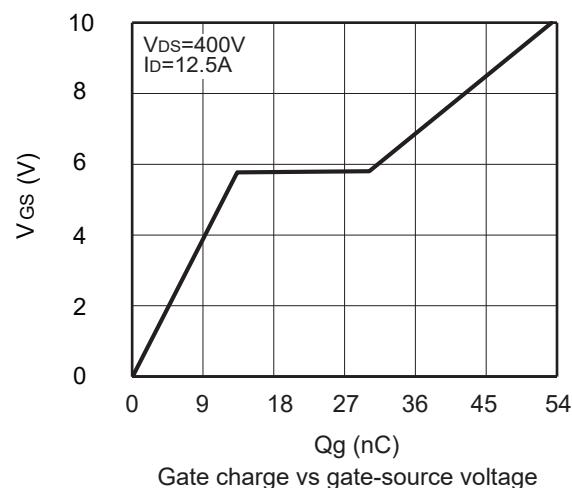
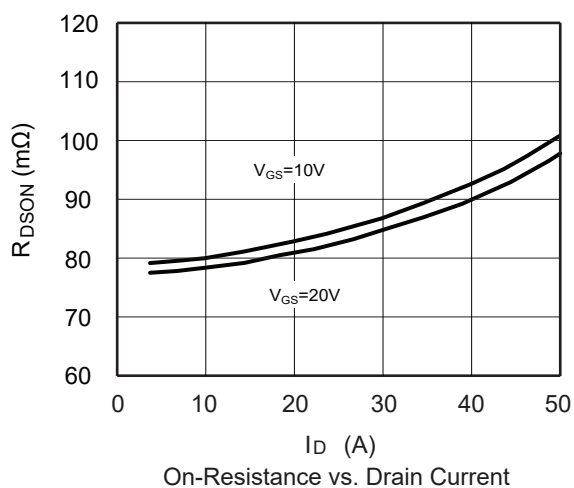
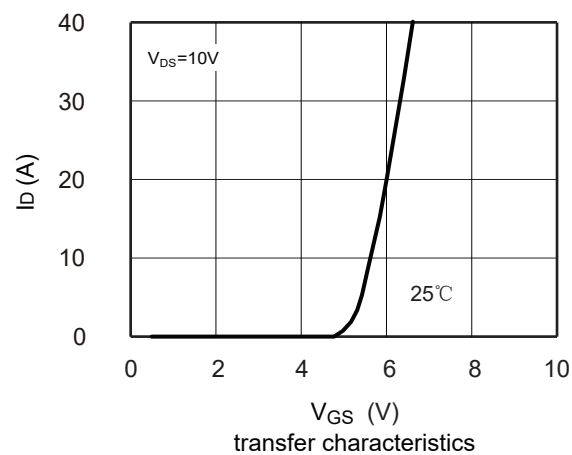
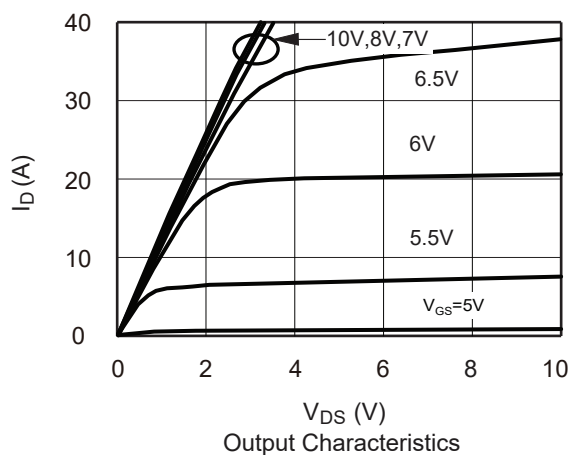
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## Typical Characteristics



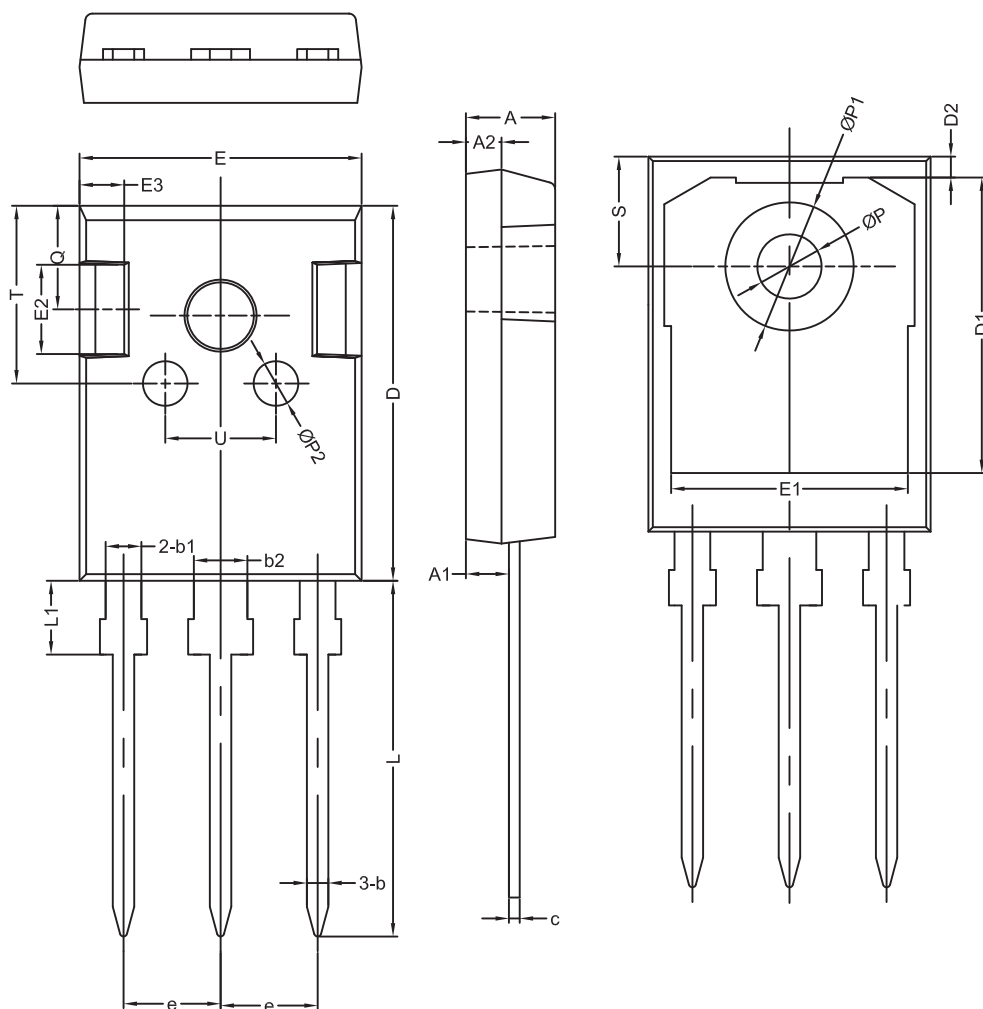
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## Package Dimension

TO-247

Unit :mm



| 符号 | 机械尺寸/mm |       |       | 符号 | 机械尺寸/mm |       |       |
|----|---------|-------|-------|----|---------|-------|-------|
|    | 最小值     | 典型值   | 最大值   |    | 最小值     | 典型值   | 最大值   |
| A  | 4.80    | 5.00  | 5.20  | E2 |         | 5.00  |       |
| A1 | 2.21    | 2.41  | 2.61  | E3 |         | 2.50  |       |
| A2 | 1.90    | 2.00  | 2.10  | e  |         | 5.44  |       |
| b  | 1.10    | 1.20  | 1.35  | L  | 19.42   | 19.92 | 20.42 |
| b1 |         | 2.00  |       | L1 |         | 4.13  |       |
| b2 |         | 3.00  |       | P  | 3.50    | 3.60  | 3.70  |
| c  | 0.55    | 0.60  | 0.75  | P1 |         | 7.19  |       |
| D  | 20.80   | 21.00 | 21.20 | P2 |         | 2.50  |       |
| D1 |         | 16.55 |       | Q  |         | 5.80  |       |
| D2 |         | 1.20  |       | S  | 6.05    | 6.15  | 6.25  |
| E  | 15.60   | 15.80 | 16.0  | T  |         | 10.00 |       |
| E1 |         | 13.30 |       | U  |         | 6.20  |       |

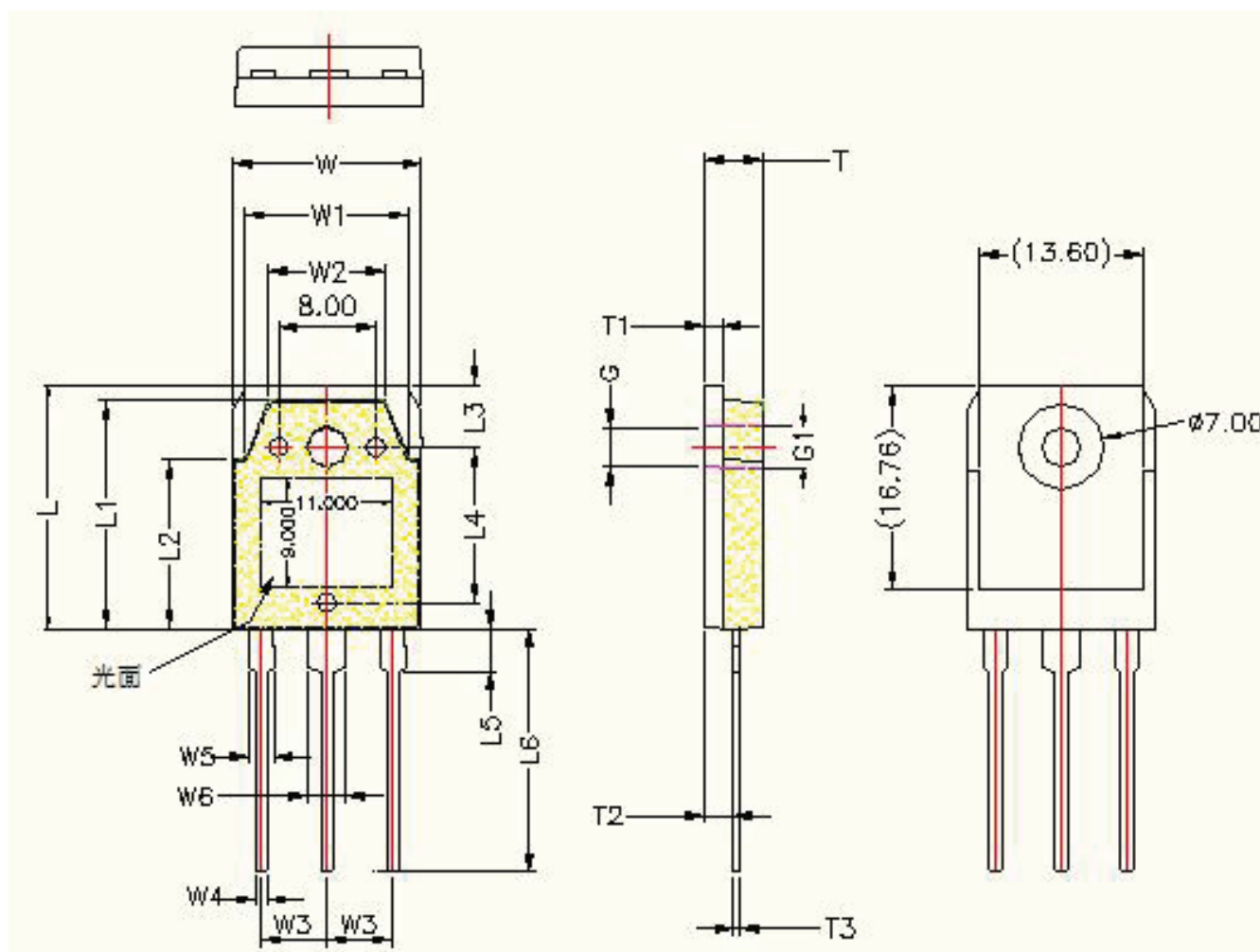
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## Package Dimension

TO-3P

Unit :mm



| Symbol | Dimensions | Symbol | Dimensions | Symbol | Dimensions |
|--------|------------|--------|------------|--------|------------|
| W      | 15.60±0.3  | L      | 19.90±0.3  | T      | 4.80±0.3   |
| W1     | 13.60±0.3  | L1     | 18.70±0.3  | T1     | 1.50±0.3   |
| W2     | 9.60±0.3   | L2     | 13.90±0.3  | T2     | 2.40±0.3   |
| W3     | 5.45(TYP)  | L3     | 5.00±0.3   | T3     | 0.60±0.3   |
| W4     | 1.00±0.3   | L4     | 12.76±0.3  | G      | Ø3.25±0.3  |
| W5     | 2.10±0.2   | L5     | 3.50±0.3   | G1     | Ø3.58±0.3  |
| W6     | 3.10±0.2   | L6     | 20.00±0.3  |        |            |